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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: PACE MICRO TECHNOLOGY PLC)
)
Application No.: 09/924,757)
)
Filing Date: 08/08/01)
)
Title: Improvements Relating to Broadcast Data Receivers)
)
Art Unit: UNKNOWN)

TRANSMITTAL OF PRIORITY DOCUMENT

Director for Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Enclosed herewith is a certified copy of British Patent Application No. 0019797.0
for which the above-identified patent application claims priority from.


If, for any reason, this priority document is not acceptable, please inform the
undersigned as soon as possible.

Respectfully Submitted

HEAD, JOHNSON & KACHIGIAN

Date: 09/14/01

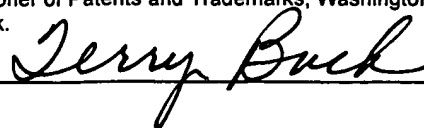
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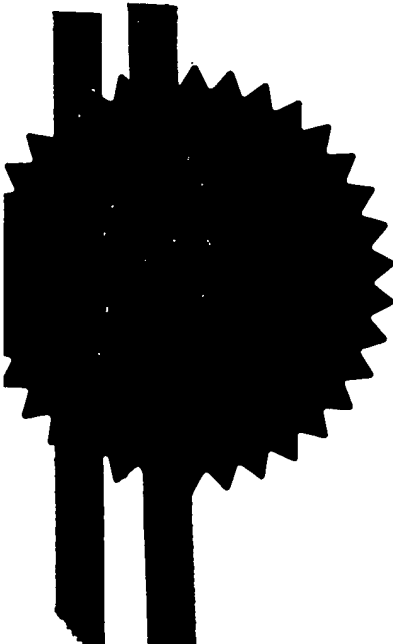
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1. Your reference	GW/MK/G30252		
2. Patent application number (The Patent Office will fill in this part)	0019797.0		
3. Full name, address and postcode of the or of each applicant (underline all surnames)	Pace Micro Technology Plc Victoria Road Saltaire Shipley BD18 3LF England 7588569001		
Patents ADP number (if you know it) If the applicant is a corporate body, give the country/state of its incorporation			
4. Title of the invention	Improvements Relating to Broadcast Data Receivers		
5. Name of your agent (if you have one)	Bailey Walsh & Co.		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	5, York Place Leeds LS1 2SD		
Patents ADP number (if you know it)	224001		
6. If you are declaring priority from one or more earlier patent applications, give the and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / years)
7. If this application is divided or otherwise derived from an earlier UK application, the earlier application	Number of earlier application	Date of filing (day / month / years)	
8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer "Yes" if:	YES		
a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body See note (d)			

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Description 5

Claim(s)

Abstract

Drawing(s)

10. If you are also filing any of the following, state how many of each item.

Priority Documents

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Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

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11. I/We request the grant of a patent on the basis of this application

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Date

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12. Name and daytime telephone number of person to contact in the United Kingdom

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Improvements Relating to Broadcast Data Receivers

The invention to which this application relates is to an improvement in the operation of broadcast data receivers which is a form of electrical and electronic apparatus provided for the reception of data which is broadcast from a remote location and then transmitted via any of satellite, cable or terrestrial transmission systems to a number of receivers. When received, the data is processed to allow the generation of video, audio and auxiliary functions via a television set or other display screen and speakers.

As part of the processing of the data via a broadcast data receiver, there is a conditional access system utilised which allows the broadcast data receiver to be rendered inoperable if the user of the receiver is not authorised or has not subscribed to the particular service. In order to allow this to be achieved, it is typically the case that there is a processor integrated circuit provided by the broadcast service provider which can be activated and selectively deactivated by the broadcast service provider from time to time as they require. In order to render the receiver operable, the processor is typically mounted on a card, the size of a credit card, although it should be appreciated that this could be of any desired form, and said card is then inserted into a location slot in the receiver and in which position the processor on the card can be accessed and the receiver rendered operable. It will therefore be appreciated that for the receiver, the processor on the card is extremely important and it is important to the broadcaster that it is not damaged as this can cause failure of service to the user who may then become unhappy at the service being provided.

In testing it has been shown in certain conditions that the processor on the card can be damaged and the damage can be sufficient to cause the processor to be inoperable, and hence the receiver to be inoperable. In one circumstance, if there is a loss of power to the receiver from the mains, then either the loss of power or subsequent regaining of power supply can cause irreparable damage to the processor and the aim of the present invention is to provide a system whereby the avoidance of this damage can be achieved.

In a first aspect of the invention there is provided a broadcast data receiver, said receiver provided for the reception and processing of digital data for the generation of video, audio and auxiliary functions and wherein said receiver is rendered operable by the insertion of a processor integrated circuit into the same for connection to the processing capability within the receiver and wherein detection means are provided in connection with the mains electricity supply to the receiver, prior to rectification and wherein upon detection of failure of AC pulses in the power supply, the processor capability, or parts of the processor capability of the broadcast data receiver are shut down.

By allowing early detection of the failure of a power supply, the relevant shut-down procedures can be performed prior to the mains power supply failure affecting the process capability of the broadcast data receiver.

In one embodiment, the shut-down procedure includes shutting down the processing capability of the processor mounted on a card which is inserted into the receiver and hence prevents damage to said processor. This therefore means that the processor can remain inserted in the broadcast data receiver

without the risk of damage and, when mains power supply is reinstated, the processor can again be used.

In one embodiment, in addition or alternatively to the shut down of the processor mounted on the card, other shut-down procedures can be implemented such as, for example, storing data relating to a channel which is being viewed at the instant of failure, and/or other user settings which have been selected by the user prior to the failure of power supply with said data being stored in a storage means.

In accordance with the present invention, there is provided sufficient time for a shut-down procedure to take place before the power failure at the processor of the broadcast data receiver. In one embodiment, the time available between detection in accordance with the invention and the actual failure of the power supply at the processor of the broadcast data receiver is approximately $\frac{1}{2}$ a second.

A specific embodiment of the invention is now described.

When a broadcast data receiver is in operation, part of the conditional access system for operation of the receiver is provided by the processor which is mounted on a card for insertion into the receiver, typically known as a smart card. It is found in use that if power and clock signals are suddenly lost during use of the processor on the card, it can result in damage to render the card useless. The problem with conventional means for detecting loss of power such as detecting a change in the regulated power supply voltage is that there is very little time between the detected change and the total loss of power which, in most cases, is insufficient to allow the shut-down of

relevant processing capabilities within the broadcast data receiver.

In accordance with the present invention, the mains cycle is monitored before rectification of the same and this allows the data broadcast receiver to detect exactly when the mains power is removed and gives the receiver sufficient time to react and implement shut-down procedures to avoid damage to the process capabilities within the receiver.

In use, and in one embodiment, the mains AC signal is monitored prior to rectification and is isolated from the rest of the circuit by using, for example, a capacitor, transformer or optical isolator. The pulses of the signal are then used to discharge a charging capacitor such that in normal operation the capacitor never charges to anything approaching its final voltage and this will continue for as long as the mains supply is maintained. If the mains supply is disconnected or fails, then the pulses will also stop and hence stop discharging the capacitor which will in turn allow the capacitor to charge fully. The provision of a voltage detector connected to the charging capacitor detects the exceeding of a threshold voltage and hence indicate that mains pulses are missing. The voltage detector is, in turn, then used to trigger an interrupt to the main processor and appropriate software provided in the processing capability of the broadcast data receiver can be activated to shut down the processor of the smart card so that it suffers no damage and/or provide other shut-down functions within the broadcast data receiver.

The detection as indicated above provides sufficient time to react to an impending failure of power at the processing

capability such that the shut-down functions can be performed prior to the failure of power at the processing capability.

As an alternative to detection of the capacitor charging as described above, the same invention can be achieved via a software cycle detector and timer provided to detect the failure of the mains power.

It should also be appreciated that although the invention has been described with reference to a broadcast data receiver, the invention can also be adopted in any form of electrical or electronic apparatus which is provided with a mains power supply and in which there is a need to implement the shutdown procedure prior to mains power failure at the processing capability and the invention and application herein should be clearly interpreted as relating to this form of apparatus also.

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